

INSTRUCTIONS

Instrucciones en español, página 9

General Safety Guidelines to Follow When Working on Vehicles:

- Always wear approved eye protection.
- Always operate the vehicle in a well-ventilated area. **Do not inhale exhaust gases—they are very poisonous!**
- Always keep yourself, tools, and test equipment away from all moving or hot engine parts.
- Always make sure the vehicle is in **Park** (automatic transmission) or **Neutral** (manual transmission) and that the **parking brake** is firmly set. Block the drive wheels.
- Never lay tools on vehicle battery. You may short the terminals together, causing harm to yourself, the tools, or the battery.
- Never smoke or have open flames near vehicle. Vapors from gasoline and charging batteries are highly flammable and explosive.
- Never leave vehicle unattended while running tests.
- Do not use Actron Model CP7819 Fuel Pressure Gauge on **Diesel** or **Flex Fuel** engines!
- Always keep a fire extinguisher suitable for gasoline/electrical/chemical fires handy.
- Do not confuse Air Conditioning schrader valves with the fuel rail test port.
- Always turn ignition key OFF when connecting or disconnecting electrical components, unless otherwise instructed.
- Use shop rags to cover fuel line fittings when connecting or disconnecting fuel lines **or gauges**. Avoid contact with gasoline. Dispose of all rags properly.
- Clean up all fuel spills *immediately*.
- Keep away from engine cooling fan. On some vehicles, the fan may start up unexpectedly.
- You *must* follow vehicle service manual cautions when working around the air bag system. If the cautions are not followed, the air bag may deploy unexpectedly, resulting in personal injury. Note that the air bag can still open up several minutes after the ignition key is turned OFF (or even if the battery is disconnected) because of a special energy reserve module.
- **Always** follow vehicle manufacturer's warnings, cautions, and service procedures.
- **Always** relieve fuel pressure before disconnecting fuel lines.
- The Fuel Injector and Harness Tester requires a fuel pressure gauge to be used for fuel injector testing. **Always** follow all safety guidelines and testing procedures contained in the instruction manual provided with the fuel pressure gauge.

Vehicle Service Information

The following is a list of publishers who have manuals containing electronic engine control diagnostic information. Some manuals may be available at auto parts stores or your local public library. For others, you need to write for availability and pricing, specifying the make, model and year of your vehicle.

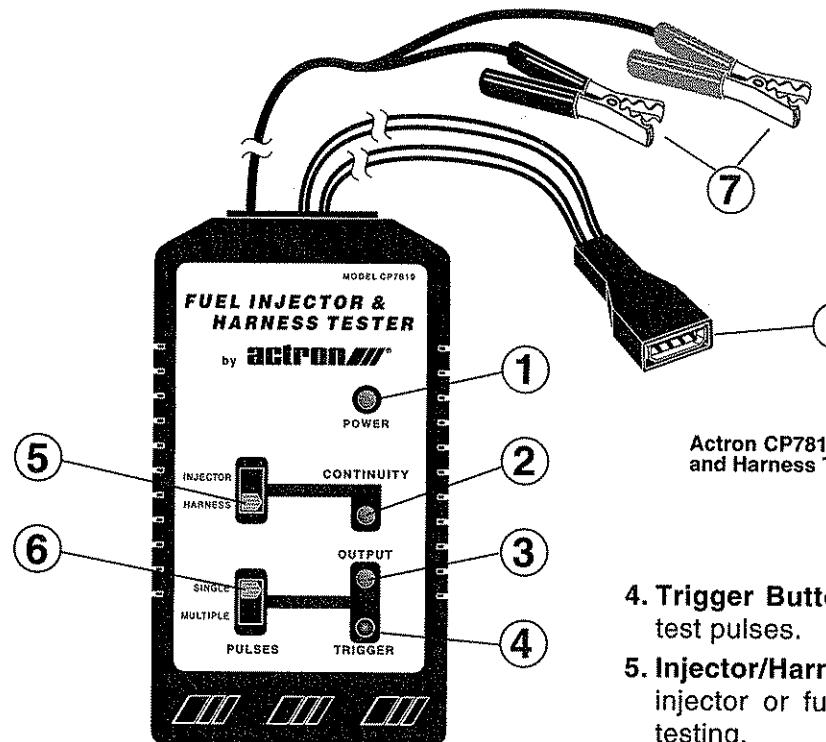
*Vehicle Service Manuals:***Chilton Book Company**
Chilton Way
Radnor, PA 19089**Haynes Publications**
861 Lawrence Drive
Newbury Park, CA 91320**Cordura Publications**
Mitchell Manuals, Inc.
Post Office Box 26260
San Diego, CA 92126**Motor's Auto Repair Manual**
Hearst Company
250 W. 55th Street
New York, NY 10019**Buick, Cadillac, Chevrolet,
GEO, GMC, Oldsmobile,
& Pontiac**
Helm Incorporated
Post Office Box 07130
Detroit, MI 48207**Saturn**
Adistra Corporation
c/o Saturn Publications
101 Union St.
Post Office Box 1000
Plymouth, MI 48170**Ford, Lincoln, & Mercury**
Ford Publication Department
Helm Incorporated
P.O. Box 07150
Detroit, MI 48207**Chrysler, Plymouth,
Dodge, Jeep, Eagle**
Dymont Distribution Service
Service Publications
12200 Alameda Drive
Strongsville, OH 44136

Fuel Injection Testing

In recent years, fuel injection has become standard equipment on most new vehicles. Although far more reliable and efficient than carburetors, fuel injection systems have their own unique problems. In many cases, fuel injection system problems can be linked to blocked or sticky fuel injectors. Testing fuel injectors was once a complicated and inaccurate procedure, but with the Actron CP7819 Fuel Injector and Harness Tester, you can quickly and easily locate any malfunctioning fuel injector without removing it from the vehicle.

The CP7819 Fuel Injector and Harness Tester is a hand-held device used to check the function of fuel injectors and their associated wiring harnesses. The CP7819 tests for clogged or leaking fuel injectors by using a single, half-second pulse. Multiple 5-millisecond pulses are used to test for sticky or sluggish fuel injectors. By using the Actron CP7818 Fuel Pressure Gauge (sold separately) and comparing fuel pressure differences as each fuel injector is pulsed, faulty injectors can quickly be identified. In addition, the CP7819 Fuel Injector and Harness Tester is able to test fuel injection wiring harnesses for faulty wiring and connectors.

Fuel Injector and Harness Tester Features



Actron CP7819 Fuel Injector
and Harness Tester

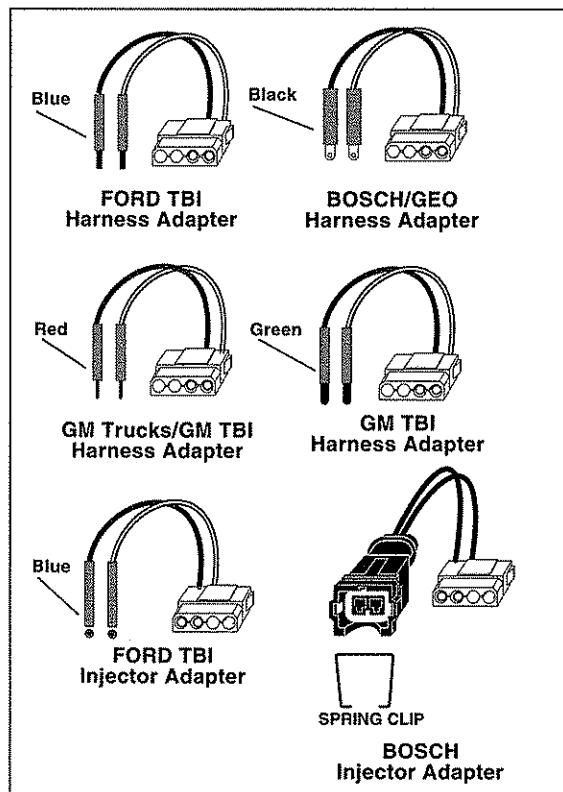
- 1. Power LED**—As soon as the battery clips are attached to the vehicle battery, the Power LED will light. This verifies a good power connection.
- 2. Continuity LED**—Indicates a good connection to the fuel injector or fuel injector wiring harness. This light must be lit before proceeding with any testing.
- 3. Output LED**—Indicates the presence of a signal from the vehicle's on-board computer to the fuel injector OR a pulse from the Tester to the fuel injector.

- 4. Trigger Button**—Activates fuel injector test pulses.
- 5. Injector/Harness Switch**—Selects fuel injector or fuel injector wiring harness testing.
- 6. Single Pulse/Multiple Pulses Switch**—Switches between one half-second and multiple 5-millisecond test pulses when the Trigger Button is pressed.
- 7. Battery Clips**—Attach to vehicle battery to power the Fuel Injector and Harness Tester.
- 8. Fuel Injector/Wiring Harness Interface Cable**—Connects the Fuel Injector and Harness Tester to a vehicle fuel injector and fuel injection wiring harness for testing.
NOTE: Requires the use of application-specific adapter (included) for fuel injector and wiring harness testing.

9. Fuel Injector/Wiring Harness Adapters—

Used to connect Fuel Injector/Wiring Harness Interface Cable to vehicle. Since all vehicles are different, several **color coded** adapters are included. Same color adapters are used for the same application—one adapter is used to connect the Interface Cable to the fuel injector, and the other connects the Interface Cable to the wiring harness.

IMPORTANT NOTE: on vehicles without schrader valves, the Actron CP7819 Fuel Injector and Harness Tester cannot test fuel injectors. In these cases, only the fuel injector harness Interface Cable adapter is supplied. See chart below:



Fuel Injection Wiring Harness Adapters

Pre-Testing Checks

1. Read Safety Guidelines.
2. Do a thorough visual and "hands-on" inspection of the engine and fuel system. Look for loose or cracked electrical wiring, battery cables, ignition wires, and fuel or vacuum lines.
3. Verify that the battery is fully charged and fuel tank has an adequate supply of fuel.

4. Verify that the inertia switch on certain Ford/Lincoln/Mercury vehicles has not been tripped—the **inertia switch is usually located in the trunk and may be labeled with a warning tag.**

5. Verify that all fuel system fuses are good.
6. Verify that the fuel vapor recovery system and gas cap are in good condition.
7. Verify that manifold vacuum is within manufacturers specification (**typically 18-20 in. at idle.**)
8. Look for fuel leaks and wipe up any spilled fuel immediately.
9. Has the vehicle been serviced recently? Sometimes things get reconnected in the wrong place, or not at all.
10. Don't take shortcuts. Inspect wiring which may be difficult to see because of location beneath air cleaner housings, alternators and other components.

11. Inspect wiring harness for:

- Contact with sharp edges (this happens often).
- Contact with hot surfaces, such as exhaust manifolds.
- Pinched, burned or chafed insulation.
- Proper routing and connections.

12. Check electrical connectors for:

- Corrosion on pins.
- Bent or damaged pins.
- Contacts not properly seated in housing.

NOTE: Problems with connectors are common in the engine control system. Inspect carefully. Note that some connectors use a special grease on the contacts to prevent corrosion. Do not wipe off! Obtain extra grease, if needed, from your vehicle dealer. It is a special type for this purpose.

13. Check other vehicle systems:

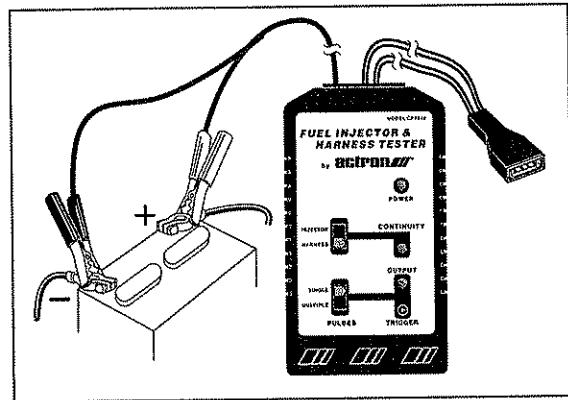
- Ignition—For safety reasons, most engine computers will not deliver fuel without an ignition spark.
- Engine computer—The engine computer has special drivers which energize the fuel injectors. These drivers are fragile and can break easily. If you suspect a computer driver problem, test by replacing the computer with a known good computer and retest.

Testing with the Fuel Injector and Harness Tester

NOTE: Before beginning any testing, perform diagnostic procedures described in vehicle service manual to eliminate other possible causes of driveability problems. Compression and ignition problems may imitate fuel injection system problems.

Before proceeding with Fuel Injector and harness testing, read and understand all safety guidelines and perform all pre-testing checks.

Test 1: Fuel Injectors



1. Connect the Fuel Injector and Harness Tester to vehicle battery.

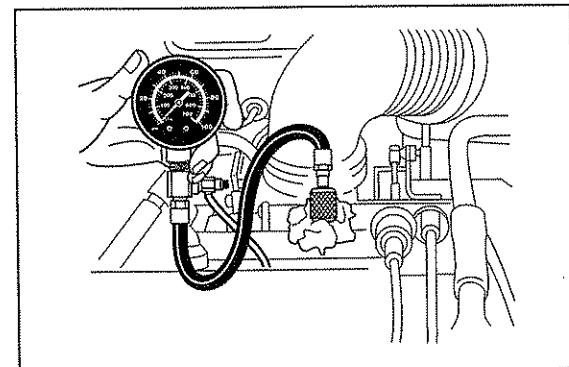
Connect battery clips to the vehicle battery: RED to the positive (+) terminal and BLACK to a good vehicle ground (-). Be sure the Power LED is lit before continuing.

2. Connect Actron CP7819 Fuel Pressure Gauge (not included) to fuel line. Most vehicles have a schrader valve located on the fuel rail for this purpose.

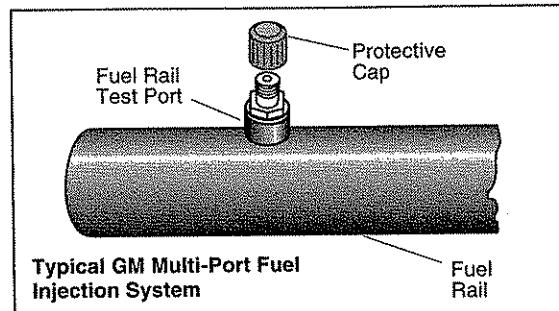
- The **fuel rail** is a metal tube which connects all of the fuel injectors and supplies the injectors with pressurized fuel from the gas tank.
- The **schrader valve** looks similar to a tire valve, and may be covered with a screw-on plastic cap. **DO NOT** confuse air conditioning schrader valve with fuel line schrader valve.

c) Read and follow all **Pre-Testing Checks, Safety Precautions, and Fuel Pressure Testing Procedures** contained in the fuel pressure gauge's instruction manual.

NOTE: Always use caution when working around fuel systems. The fuel in the fuel rail may be pressurized even if the engine is not running. Use a rag to cover the schrader valve whenever opening the fuel system to attach gauges. Clean all fuel spills immediately. **Observe all safety precautions included with fuel pressure gauge.**

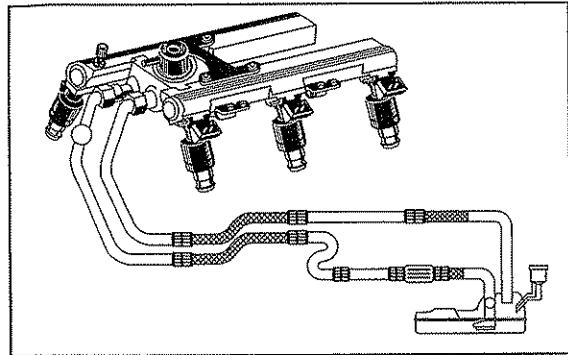


Installing Fuel Pressure Gauge (not included)
on Fuel Rail



3. Test for fuel system leaks:

- Pressurize fuel system by cycling ignition ON and OFF every ten seconds until fuel pressure is at manufacturer's specifications (generally 30-50 psi—check vehicle service manual for your particular application).
- Observe pressure gauge for 10-15 seconds, looking for pressure drop.
- If the pressure **does not** drop, continue with fuel injector testing Step 4. If fuel pressure **does** drop, continue looking for leaks by blocking off the return line between the fuel pressure regulator and the gas tank. Retest as described above.

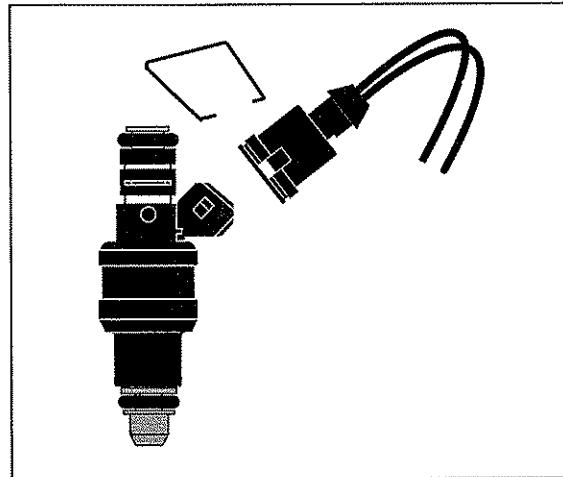


- d) If the pressure drops again, there may be one or more leaky injectors. Later tests will identify malfunctioning injectors.

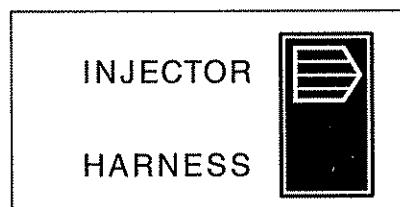
4. Test fuel injectors:

IMPORTANT: Do not pulse fuel more than once per cylinder. Start and run the engine briefly after pulsing fuel once into all cylinders. This clears excess fuel from the intake ports. Failure to do so could cause hard starting, severe engine flooding, catalytic converter damage, or fire.

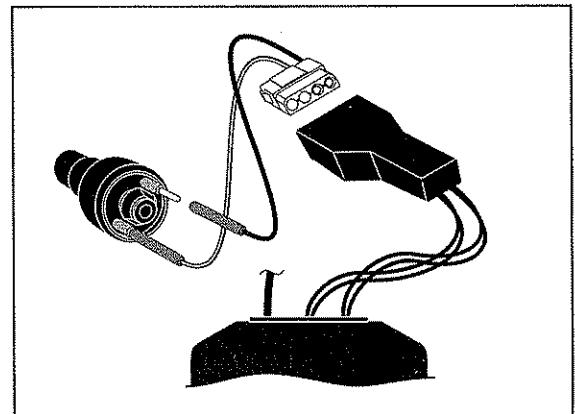
- a) Carefully disconnect wiring harness from fuel injector being tested. (**NOTE:** Do not jerk or pull on wires—some harnesses are attached with clips.) It is a good idea to test injectors in sequence, beginning with cylinder #1.



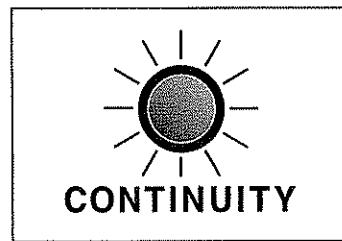
- b) Set **Injector/Harness** switch to **Injector**.



- c) Attach appropriate injector adapter to Fuel Injector/Wiring Harness Interface cable.
d) Connect Fuel Injector and Harness Tester to fuel injector. For most injectors (except Bosch type) it does not matter which wire is connected to which terminal on the injector. Make sure the injector adapter wires are securely fastened to the fuel injector terminals and that there is no exposed metal between them. For Bosch type injectors, the injector adapter is keyed so it can only be attached one way.



- e) Verify that the Continuity LED is lit. If Continuity LED does not light, check all electrical connections. If all electrical connections are secure and LED remains OFF, injector is faulty and should be replaced.



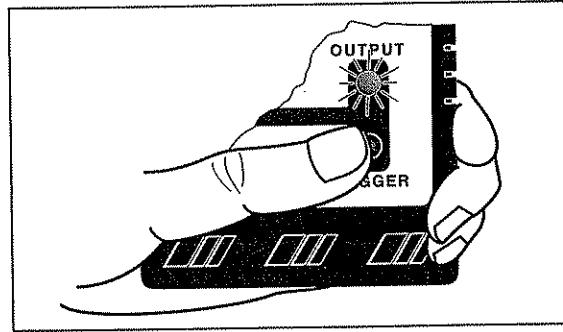
- f) Set **Pulse** switch.
 - **Single** will test for clogged injectors.
 - **Multiple** will test for sticky or sluggish injectors.

g) Re-pressurize fuel system as described in Step 3. Be sure that fuel pressure is stable before continuing. Record this initial fuel pressure for reference.

NOTE: Fuel system must be re-pressurized to manufacturer's specifications before testing **each** fuel injector.

- h) Press **Trigger** switch to energize fuel injector. Output LED will flash briefly as injector is energized by the Tester.

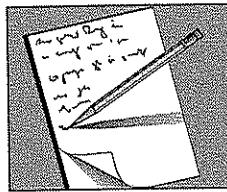
IMPORTANT: Do not pulse fuel more than once per cylinder. Start and run the engine briefly after pulsing fuel once into all cylinders. This clears excess fuel from the intake ports. Failure to do so could cause hard starting, severe engine flooding, catalytic converter damage, or fire.



- i) Record fuel pressure drop 2-3 seconds after pulse.

IMPORTANT:

Make sure that each injector's pressure drop is recorded the same amount of time after the pulse. If this time interval varies, the test results will be inaccurate due to normal fuel system breakdown.



- j) Repeat steps a-i with the next injector until all injectors have been tested.
- k) After testing all injectors with **Pulse** switch in one position (Single or Multiple), repeat steps a-j with the **Pulse** switch in the position other than the one just tested.

5. Fuel Injector test results:

- a) Using the pressure values for each cylinder you recorded in **Step 4-i**, compare pressure differences between the injectors. **NOTE:** Injectors showing significant (more than 2.0 psi) pressure change should be retested to be certain that there were no variations in the test procedure.
- When testing with a **Single Pulse**: Clogged injectors will show less pressure drop than healthy injectors. Leaking injectors will show more pressure drop than healthy injectors.

- When testing with **Multiple Pulses**: Sticky or sluggish injectors will show less pressure drop than healthy injectors.

- b) Flush or clean any injector which continues to show a variation of more than 2.0 psi when compared to the other injectors.

NOTE: Be sure to compare readings taken during Single and Multiple pulse testing separately. Pressure values for single pulses can be much different than values for multiple pulses.

- c) Retest and replace any injector which does not improve after being flushed and cleaned.

6. After testing:

- a) Disconnect all tester leads from fuel injectors and harnesses.

NOTE: Always grasp adapter ends near terminals when removing from injectors and harnesses to prevent damage. Do not tug or jerk adapter wires from terminals.

- b) Remove tester battery clips from battery.

- c) Fully depressurize fuel pressure gauge and fuel system before removing gauge from schrader valve. Use a shop rag to cover the valve in case any fuel sprays out. Replace schrader valve cap, if removed. **NOTE:** Fuel system may still be under pressure, even if the engine is not running. Clean all fuel spills immediately.

IMPORTANT: Follow all procedures outlined in the fuel pressure gauge instruction manual for the safe way to remove the gauge from the schrader valve.

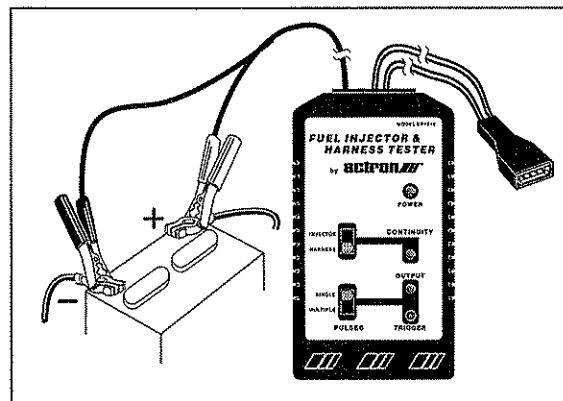
- d) If the excess fuel in the intake ports has been purged by starting the vehicle after each injector test, reconnect all injector wiring harnesses to injector.

IMPORTANT SAFETY NOTE: If excess fuel has NOT been purged following each injector test, vehicle damage may result when engine is started. To clear excess fuel, disconnect ALL fuel injectors and crank engine. Engine may start and run roughly, then die. This is normal. Reconnect all injectors.

Test 2: Fuel Injection Wiring Harness

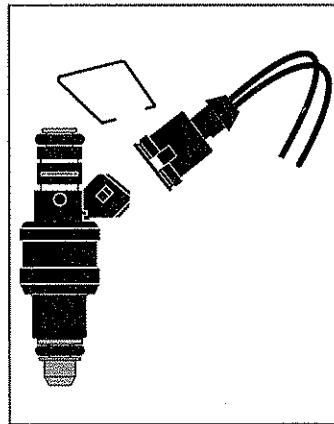
1. Connect the Fuel Injector and Harness Tester to the vehicle battery.

- a) Connect battery clips to the vehicle battery: RED to the positive (+) terminal and BLACK to a good vehicle ground (-). Be sure the Power LED is lit.

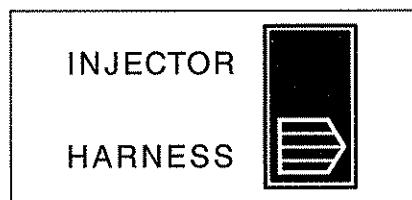


2. Test fuel injector harness (repeat steps a-e for each injector harness):

- a) Carefully disconnect wiring harness from fuel injector being tested. Do not jerk or pull on wires—some harnesses are attached with clips. It is a good idea to test injector wiring harnesses in sequence, beginning with cylinder #1.

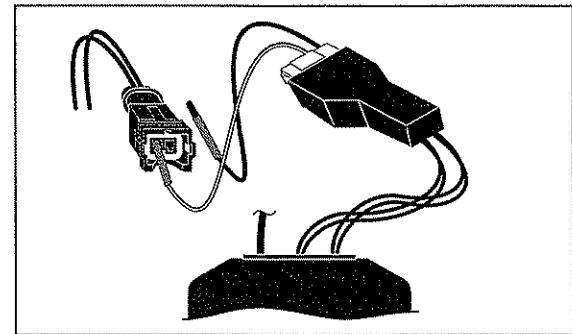


- b) Set **Injector/Harness** switch to **Harness**.



- c) Connect appropriate harness adapter to the interface cable.

d) Connect Fuel Injector/Wiring Harness Interface Cable to **wiring harness** of fuel injector being tested using the appropriate adapter. For all harness adapters, it does not matter which wire is connected to either terminal of the wiring harness. The tester is designed in such a way that hook-up orientation does not matter.

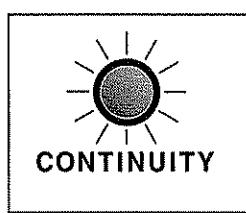


NOTE: The continuity LED maybe bright, dim, or off. The status of the continuity LED becomes important in later testing.

- e) Turn vehicle ignition key ON, but *do not start vehicle*.

NOTE: On most vehicles, the Continuity LED will now be on. If the Continuity LED remains off, further testing will determine if a problem exists.

- f) Start the engine – If engine will not start, then have an assistant crank the engine so you can observe the LED's. **NOTE:** Vehicle may start and run even with one or more injectors disconnected. This does not affect the harness test. Observe all safety precautions!



Verify that the Continuity LED is lit, and the Output LED is flashing. **NOTE:** Output LED may flash so quickly that it appears to remain on. This is normal.

If the Continuity LED does not light, and the Output LED is not flashing, then check all electrical connections. If all electrical connections are good, then proceed to Step g.

- g) Wiring Harness Test Results.

- If the Continuity LED lit up and the Output LED flashed, the the wiring harness for that fuel injector is good.

- If the Continuity LED failed to light, then there is a problem with the fixed voltage wire in the injector wiring harness. Use a digital multimeter to check for an open or short circuit.
- If the Output LED does not flash, then...
 - Check fuel injector wiring harness for an open or short circuit in the wire that turns the fuel injector ON and OFF.
 - The driver in engine computer may be faulty. Substitute good computer and retest.
 - Check ignition system. For safety reasons, most fuel injection systems will not deliver fuel without the presence of ignition reference pulses from the ignition module. **NOTE:** This only applies to a "No Start" condition.

h) Repeat steps a-g for each injector.

3. Disconnect Tester from wiring harness and reconnect all wires. Start and run engine to be sure that all injectors are firing normally.

Care and Maintenance

- Keep all Fuel Injector and Harness Tester electrical connections clean and free of corrosion.
- If Fuel Injector and Harness Tester face becomes dirty, wipe clean with a damp rag. **DO NOT use alcohol or other strong solvents as they may remove face printing.**
- Use care to prevent Fuel Injector and Harness Tester wiring insulation from becoming chafed or broken. Do not use Tester if insulation or wiring is damaged.

FULL ONE (1) YEAR WARRANTY

Actron Manufacturing Company, 35825 Industrial Parkway, Cleveland, Ohio 44135, warrants to the user that this unit will be free from defects in materials and workmanship for a period of one (1) year from the date of original purchase. Any unit that fails within this period will be repaired without charge when returned to the Factory. Actron requests that a copy of the original, dated sales receipt be returned with the unit to determine if the warranty period is still in effect. This warranty does not apply to damages caused by accident, alterations, or improper or unreasonable use. Expendable items, such as batteries, fuses, lamp bulbs, flash tubes also are excluded from the scope of this warranty. ACTRON MANUFACTURING COMPANY DISCLAIMS ANY LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY WRITTEN WARRANTY ON THE UNIT. Some states do not allow the disclaimer of liability for incidental or consequential damages, so the above disclaimer may not apply to you. This warranty gives specific legal rights, and you may also have rights which vary from state to state.

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